

BIBLIOGRAPHICAL NOTICE.

Practical Zoology for Medical and Junior Students. By J. D. F. GILCHRIST and C. von BONDE. Pp. xi + 329, 105 text-figures. Edinburgh: E. and S. Livingstone, 1922. Price 15s. net.

THIS book is intended for students of elementary zoology, and, as it is designed especially for use in South Africa, it includes directions for the study not only of animals commonly used in laboratories in this country, but also of certain South African types. Each alternate page is left blank for the reception of the student's notes and drawings. The numerous illustrations are, with few exceptions, original, and are clear and well reproduced.

The treatment is on strictly traditional lines, and the work is more likely to be useful in South Africa than in this country, where it is hardly likely to displace the well-tried text-books now in use. Only two South African types are described in detail—namely, the crawfish, *Jasus*, and the platana, or clawed toad, *Xenopus*. In the accounts of these we find some very surprising statements indeed. For instance, it is stated that in *Jasus* there are no appendages on the last abdominal somite (p. 94), and the antennule of the same animal is described as follows:—"The protopodite is two jointed, the ondopodite is a single two-jointed rod terminating in two small flagella, and the exopodite is absent" (p. 102).

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

April 12th, 1922.—Prof. A. C. Seward, Sc.D., F.R.S., President, and afterwards Dr. H. H. Thomas, V.P.G.S., in the Chair.

The following communications were read:—

1. 'On a Collection of Carboniferous Plants from Peru.' By Albert Charles Seward, Sc.D., F.R.S., Pres.G.S.

The plants described by the Author were collected by Mr. J. A. Douglas in 1911 from coal-bearing strata on the south side of the Peninsula of Paracas, a few miles south of Pisco on the coast of Peru. Although the specimens are few in number and for the greater part fragmentary, they are of considerable interest: they demonstrate the occurrence on the coast of Peru of Carboniferous strata; whether the plants should be referred to an Upper or a Lower horizon is not certain. Hitherto no fossiliferous Palaeozoic rocks have been recorded from the Peruvian coast.

2. 'The Geological History of the Genus *Stratiotes*: an Account of the Evolutionary Changes which have occurred within the Genus during the Tertiary and Quaternary Eras.' By Miss Marjorie Elizabeth Jane Chandler. (Communicated by Mrs. E. M. Reid, B.Sc., F.L.S., F.G.S.)

Stratiotes, a monotypic genus of European and West Asian water-plants, is the descendant of a line of ancestors which can be traced back to the Eocene. The seeds have long been known in the fossil state as *Folliculites*, *Paradoxocarpus*, etc., but their relationship with *Stratiotes* was not recognized until 1896. For many years the subject was in hopeless confusion, because the species were ill-defined and the types and type-localities lost or inadequately studied.

The recent seed is first investigated, and an account then given of the modifications which have occurred in the genus since the Eocene Period. Nine species are described or redefined, of which *S. aloides* alone is still living. Seven of them appear to constitute links in an evolutionary chain which terminates in the recent plant, while two perhaps represent a branch-line of evolution, distinguished by certain peculiarities of form and raphe.

As the fossil species occur in great abundance, and as several of them are widespread geographically, while each seems to have a limited range in time, there is a hope that *Stratiotes* may prove of value in the correlation of isolated freshwater deposits in Europe.

May 10th, 1922.—Prof. A. C. Seward, Sc.D., F.R.S.,
President, in the Chair.

The following communications were read:—

1. 'The Lower Carboniferous Succession in the Settle District and along the line of the Craven Faults.' By Prof. Edmund Johnston Garwood, Sc.D., F.R.S., V.P.G.S., and Miss Edith Goodyear, B.Sc., F.G.S.

For some years past the problem presented by the marked change in the character of the Lower Carboniferous rocks in the neighbourhood of the Craven Faults has attracted the attention of geologists. This change was attributed by the late Mr. R. H. Tiddeman to faulting along the line of the Craven Faults during the deposition of the beds, while Prof. J. E. Marr has suggested that the special 'knoll-reef' structures characteristic of the beds lying south of the faults, are the result of earth-movements of post-Carboniferous date. An essential feature of the problem is the marked and sudden change in the character of the faunas, in the neighbourhood of the Middle Craven Fault, east of Settle. The present communication records an attempt to solve the problem by the method of detailed mapping of definite faunal horizons.

Two distinct facies can be recognized in the district, which may be denominated the North Country type and the South Country type respectively. The standard succession adopted for the North Country type is the zonal sequence already established for West-

morland, the South Country type being represented by the 'knoll-reef' limestone, Pendleside Series, and Bowland Shales.

The district surveyed includes the area between the Dent Fault and the valley of the Wharfe, south of a line drawn east and west through Ribbleshead. Starting from this line, the northern facies has been traced to its southernmost limit, and the exact position, where the change to the southern facies takes place, has been ascertained. The results may be summarized as follows:—

(1) The whole of the country north of the North Craven Fault belongs to the North Country type, and includes the general succession between the *Michelinia* Zone and the Main or Great Limestone. The district was submerged considerably later than the Shap-Ravenstonedale area, the submergence over the greater part of the district not occurring until the *Nematophyllum-minus* sub-zone was being laid down. The beds, as a whole, show a deeper-water origin than those of corresponding horizons in Westmorland. This is especially noteworthy in the case of the Lower *Dibunophyllum* sub-zone. There is no Bryozoa Band, but the Porcellanous Bed which also occurs at that horizon is taken as the base of D_1 . The Main Limestone, too, is much less fossiliferous than is the case in Wensleydale. Both the *Cyrtina-septosa* Band and the *Girvanella* Nodular Band are well developed, and constitute admirable horizons for mapping. A second Nodular Band occurs in the Lower *Lonsdalia* Bed, which has a wide geographical range; it is due to a special organic structure, and may be correlated with the Oxford Limestone of Northumberland. The horizon of the Hardraw Shale is characterized by *Productus pugilis* round Ingleborough and by *Posidonomya becheri* in Wensleydale. The specimens of the latter fossil found at Budle in Northumberland probably occur at this horizon.

(2) The strip of country between the faults belongs also, as a whole, to the North Country type, and marks the southern margin of the North-Western Province. The *Orionastræa* Band forms an important horizon here, and represents the summit of the Hardraw-Sear Limestone round Ingleborough; below it occurs a Bryozoa-Band characterized by *Athyris lamellosa* which, near Malham, contains a special fauna with *Codaster*, cup-corals and trilobites. The area is traversed by numerous normal faults trending usually north-westwards and south-eastwards; but, near Ingleton, the beds are repeated on themselves by thrusts. Dolomitization occurs in connexion with the faulting, and secondary quartz-crystals have developed in the limestone near planes of movement, and in association with the unconformity.

(3) At three places, between the faults, patches of rock occur, belonging to the South Country type. In Meal-Bank Quarry (Ingleton) a wedge-shaped mass of coal and shale occurs in limestone of D_1 age, and immediately east of Settle 'knoll-reef' limestone with characteristic fossils occupies the southern slopes of High Hill; while at Bordley occurs an extensive outlier of Bowland Shale, against which several horizons, belonging to the northern facies, terminate abruptly with discordant dip and strike.

The change in the faunas is everywhere accompanied by a lithological change. This change is always abrupt, and usually takes place along the line of the Middle Craven Fault; but, even where the southern facies occurs in the strip between the faults, the change is equally sudden. There is no gradual transition anywhere between the northern and the southern facies, and there is no evidence that the change was influenced by faulting during Lower Carboniferous times.

(4) The 'knoll-reef' limestone undoubtedly represents a special type of deposit, as suggested by Tiddeman; but quaquaversal dips have been developed in beds belonging to different horizons, and Prof. Marr's contention is borne out by the occurrence of 'knolls' in the northern succession in the neighbourhood of the faults, notably at Greenhow, Coldstones, and Toft Gate, where the *Cyrtina* Band, the Lower *Lonsdalia* Bed, and the *Orionastræa* Band have been folded into three separate domes along the northern margin of the North Craven Fault.

The Authors suggest that the two facies were laid down some distance apart, that they have been brought together by thrusting, that the patches of rock belonging to the southern type, which lie between the faults, are portions of an overthrust mass from the south which have escaped denudation, and that the Middle Craven Fault is a normal fault which took place subsequent to the thrusting.

2. 'The Miocene of Ceylon.' By Edward James Wayland, Assoc.R.C.S., F.G.S., and Arthur Morley Davies, D.Sc., Assoc. R.C.S., F.G.S.

Arenaceous and calcareous strata of Miocene age are found (1) over an extensive area in the north and north-west of Ceylon, from the Jaffna Peninsula in the extreme north to Puttalam in lat. 8° N., and (2) in a small part of the southern coast, at Minihagalkanda. At the latter place the beds are seen to rest upon Archæan rocks; but in the former area the base is not seen, and higher horizons are represented. The whole series appears to constitute a cycle of sedimentation, beginning and ending with arenæ-argillaceous deposits, and consisting mainly of fossiliferous limestones.

The fossils consist of foraminifera, corals, echinoids, and molluscs. The last are largely in the form of casts, exact identification of which is difficult; but they show close relations to the fossils from Kach and Sind figured by Sowerby, and A. d'Archiac and Haime, and also to recent Indo-Pacific forms. The lower horizon of Minihagalkanda is characterized by *Ostrea virleti* Deshayes, and is dated as Vindobonian (probably Tortonian); while the higher horizon of the northern area contains *Orbiculina malabarica* Carter, and may possibly be Pontian. The transgression of the sea on the continental area of Southern India and Ceylon is thus contemporaneous with its recession from the Himalayan geosyncline, in accordance with Haug's principle.